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Effects of sludge retention times on reactivity of effluent dissolved organic matter for trihalomethanes formation in hybrid powdered activated carbon membrane bioreactors

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Abstract: In this study, real municipal wastewater intended for reuse was treated by two identical hybrid PAC/MBRs (membrane bioreactors with powdered activated carbon addition), which were operated at sludge retention times (SRTs) of 30 and 180 days, respectively. In order to investigate the effects of SRT on trihalomethanes (THMs) formation in chlorinated PAC/MBR effluents, characteristics and THMs formation reactivity of effluent dissolved organic matter (EfOM) at different SRTs were examined. PAC/MBR-180 had higher level of EfOM, which contained less simple aromatic proteins and exhibited lower specific UV absorbance (SUVA). EfOM with molecular weight <5 kDa from PAC/MBR-30 (23%) was lower than PAC/MBR-180 (26%). About 50% of EfOM from PAC/MBR-30 was hydrophobic acids, which was higher than that from PAC/MBR-180 (about 36%). EfOM at SRT 180 days exhibited higher hydrophilicity. Prolonging SRT greatly reduced THMs formation reactivity of EfOM, but increased the formation of bromine-containing species during chlorination of PAC/MBR effluents.

Keywords: PAC/MBR; DOM; Fractionation; Excitation and emission matrix fluorescence

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